Microzooplankton grazing in Arctic waters

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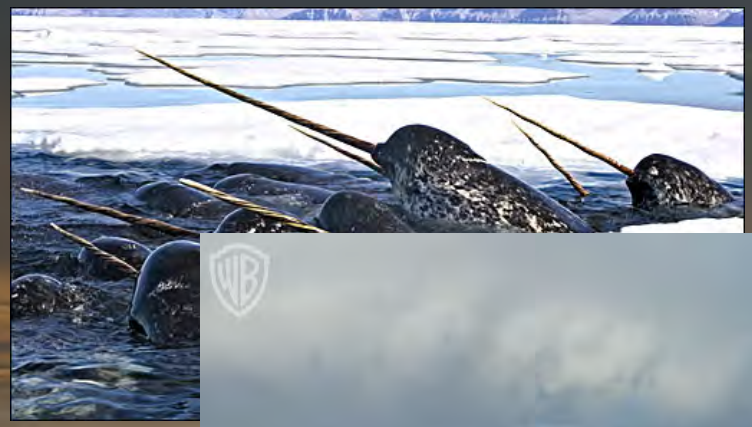
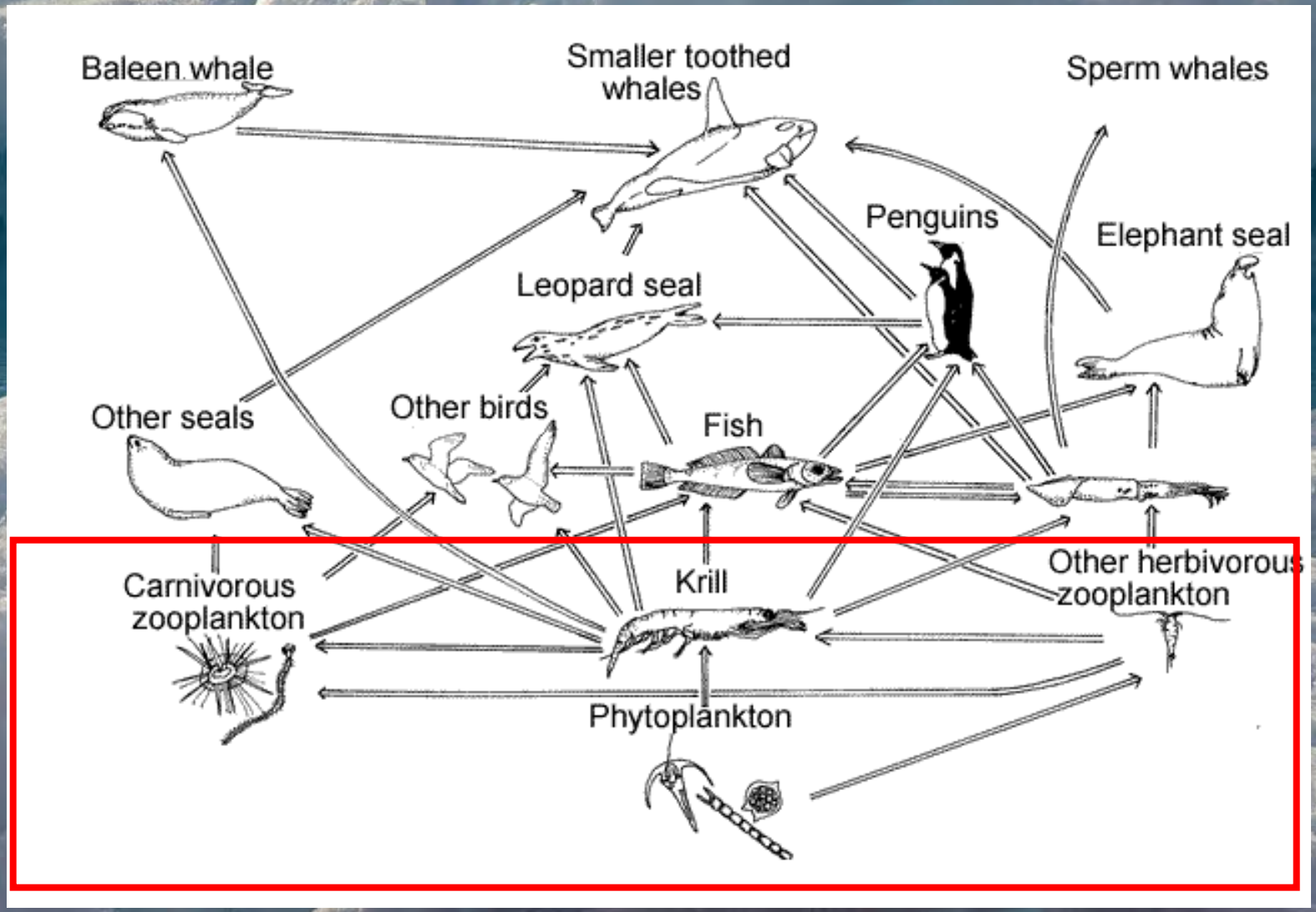
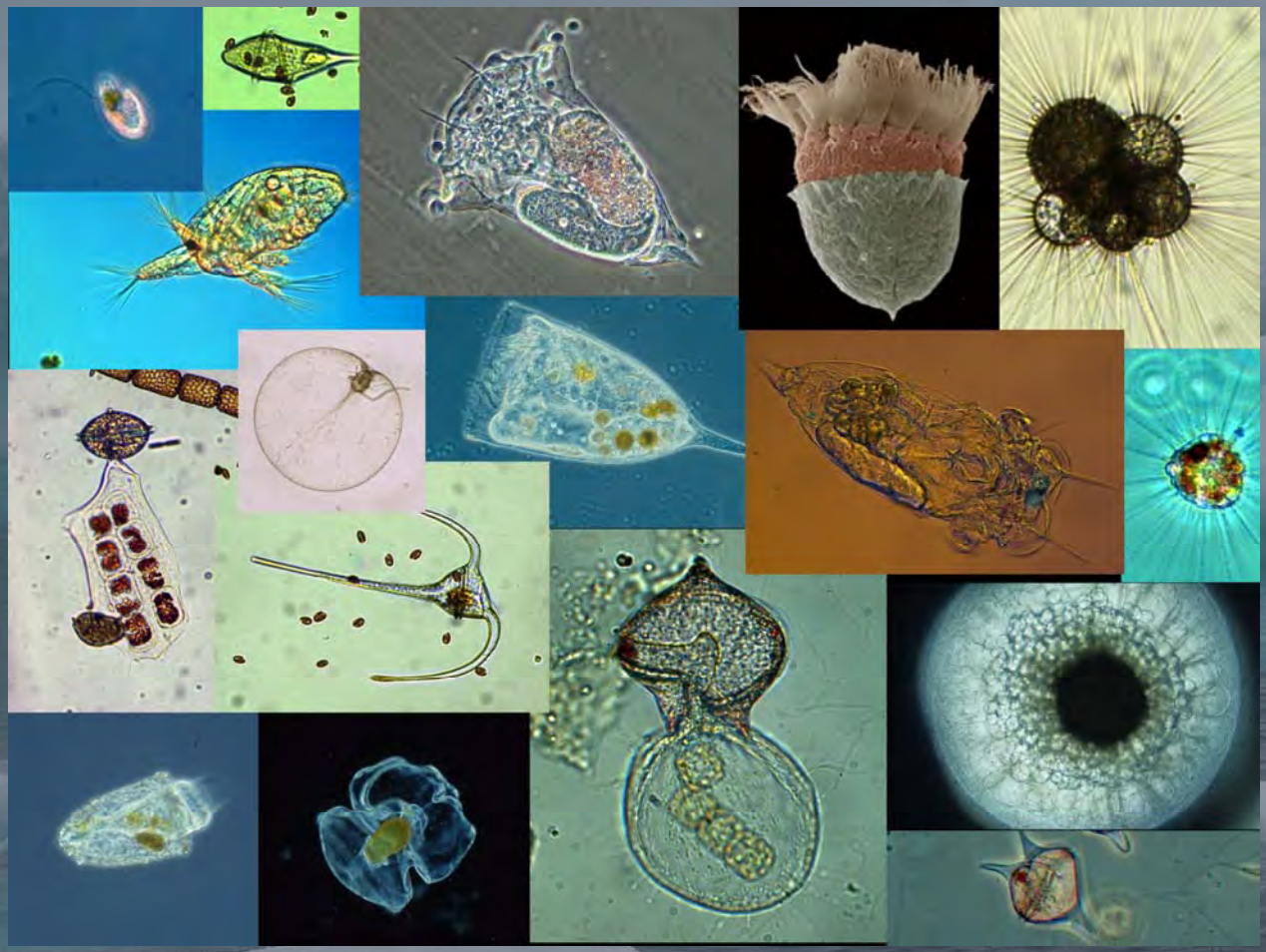
Global warming is seriously threatening Arctic wild life

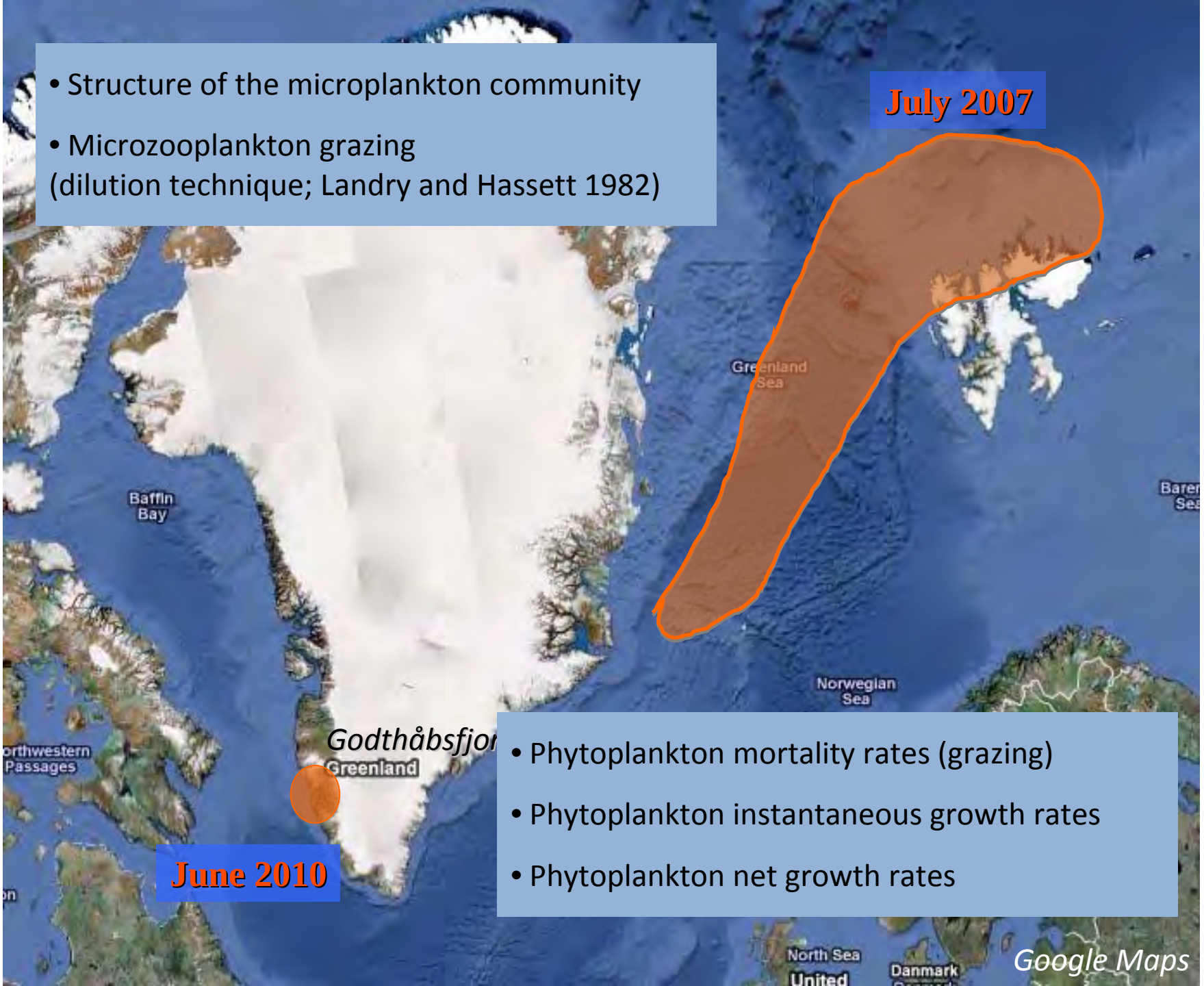


What about plankton?

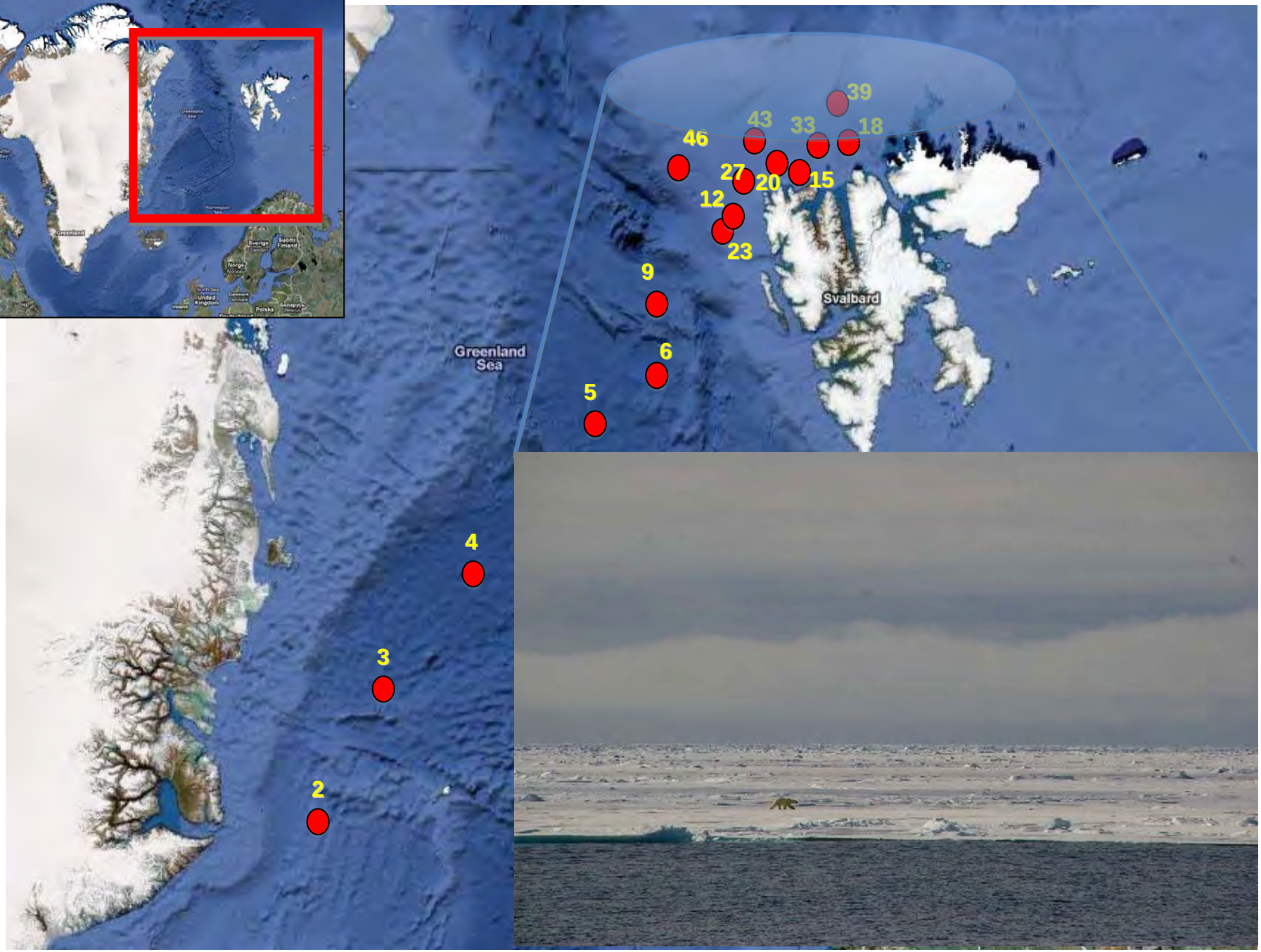


Here we will focus on microzooplankton, and on their role as grazers of phytoplankton

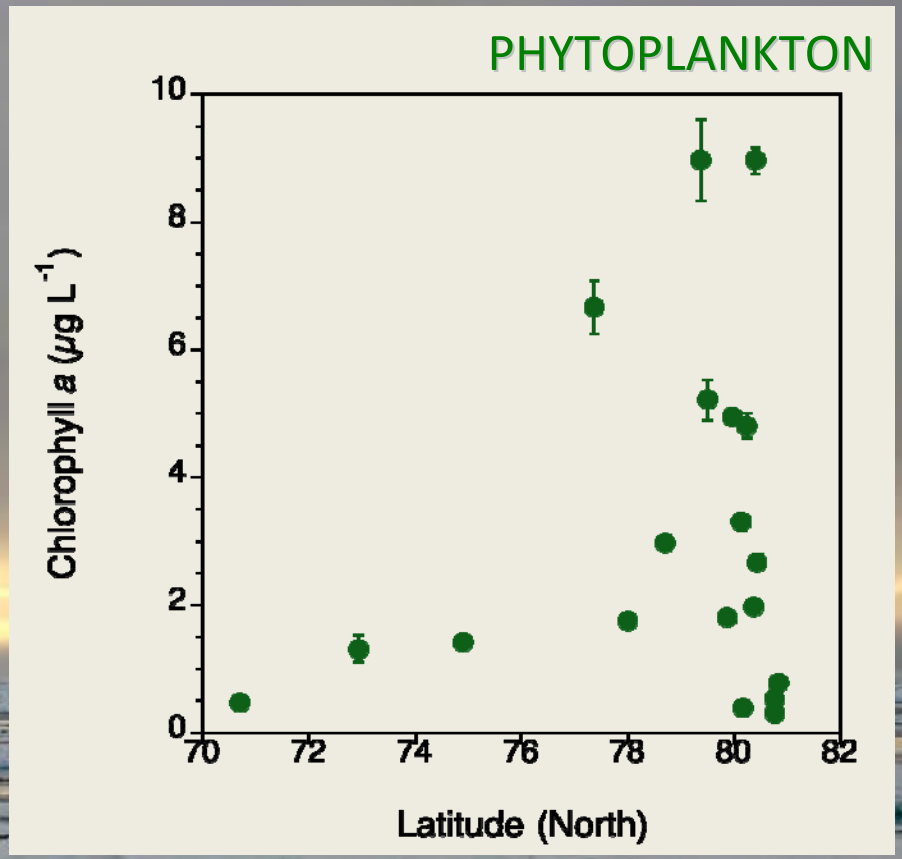



• Structure of the microplankton community
• Microzooplankton grazing
(dilution technique; Landry and Hassett 1982)
July 2007
Greenland Sea
Baffin Bay
Norwegian Sea
Godthåbsfjor
Greenland
June 2010
• Phytoplankton mortality rates (grazing)
• Phytoplankton instantaneous growth rates
• Phytoplankton net growth rates
North Sea
Danmark
Google Maps

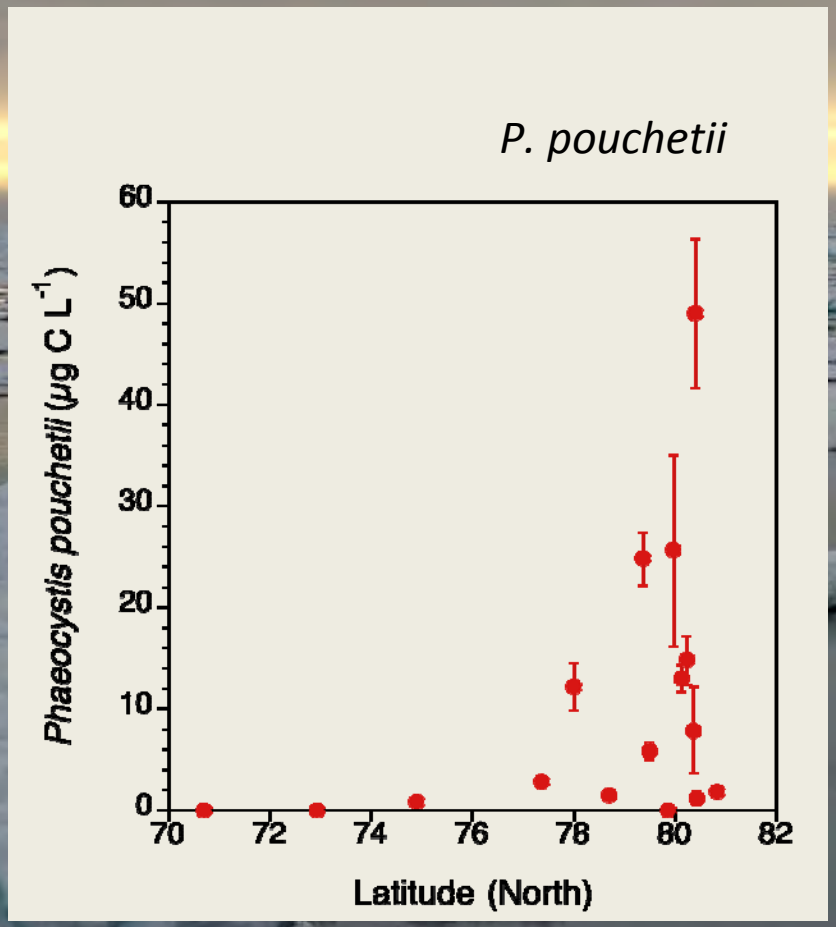
High Arctic July 2007

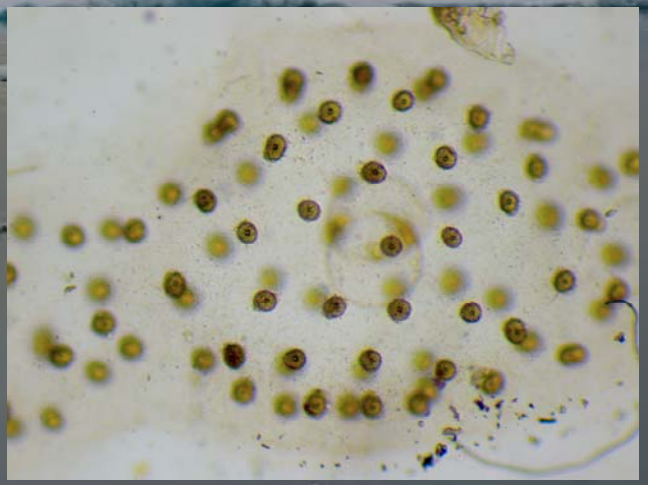


PHYTOPLANKTON

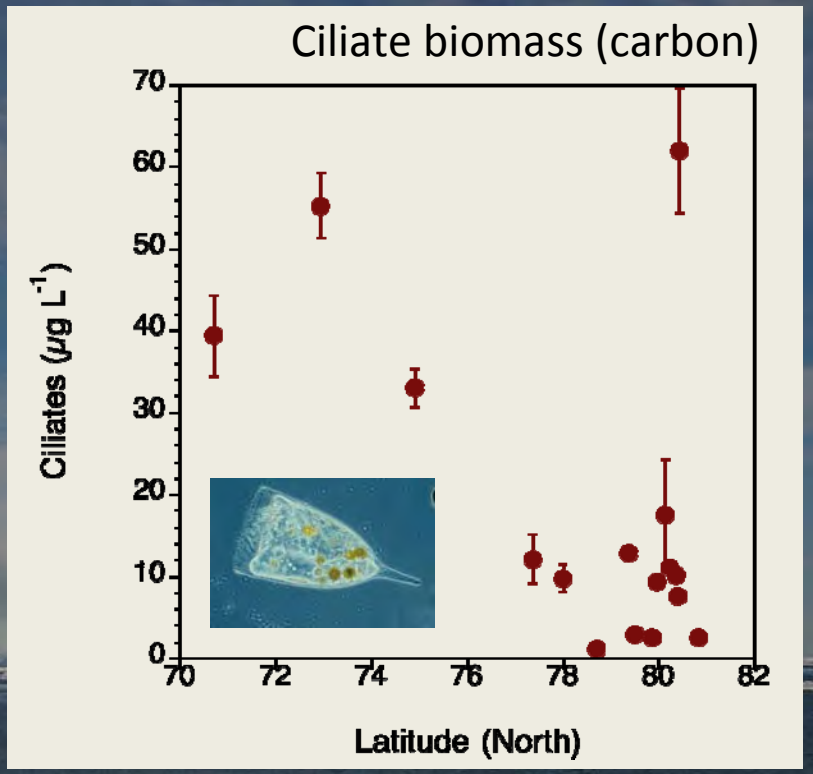


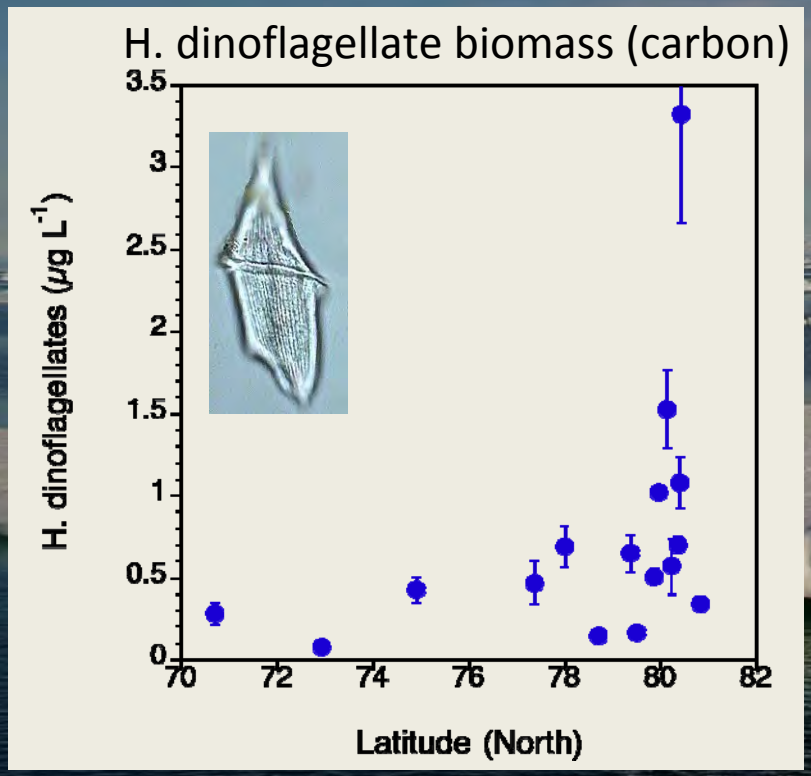
P. pouchetii

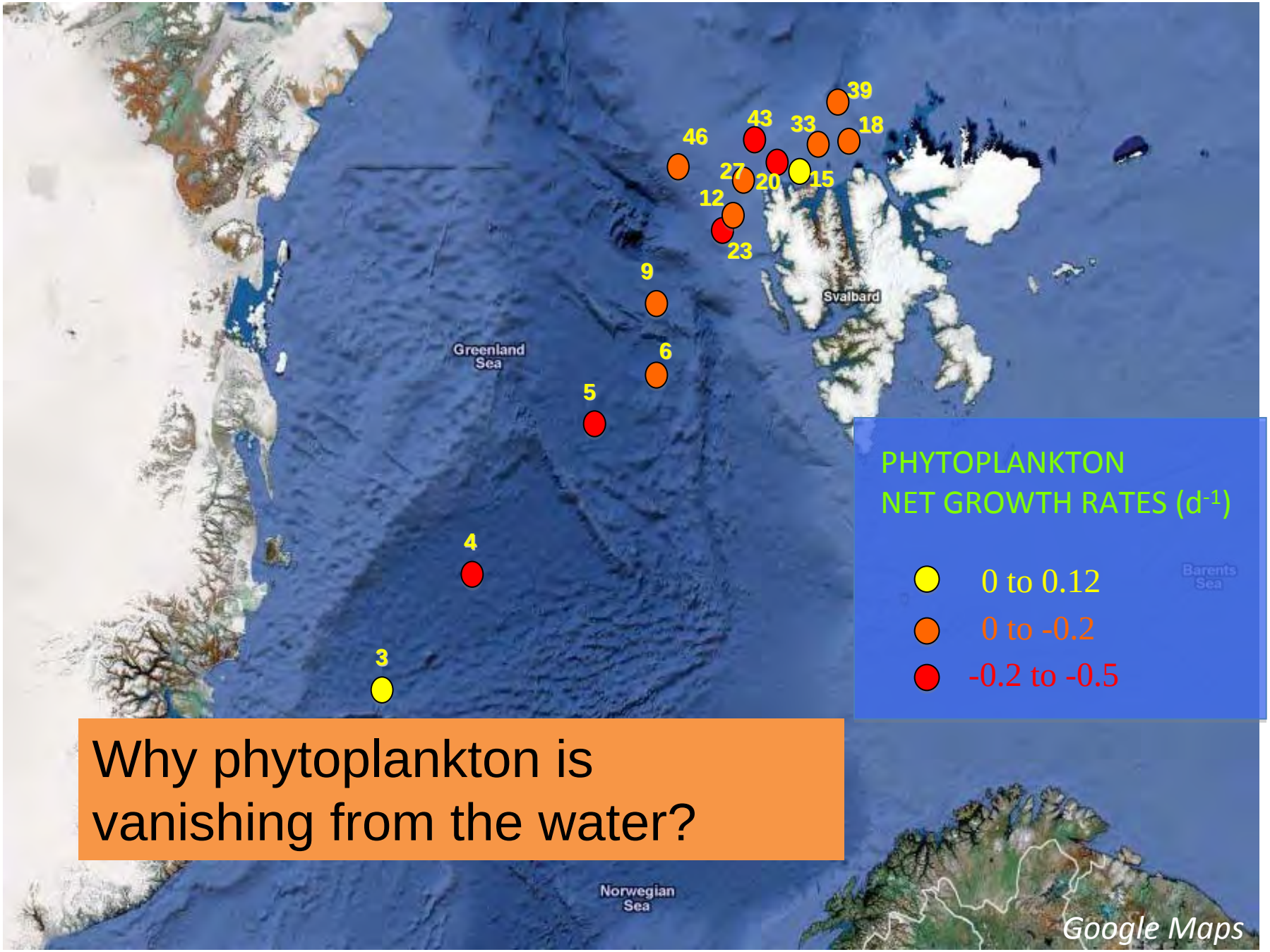




MICROZOOPLANKTON

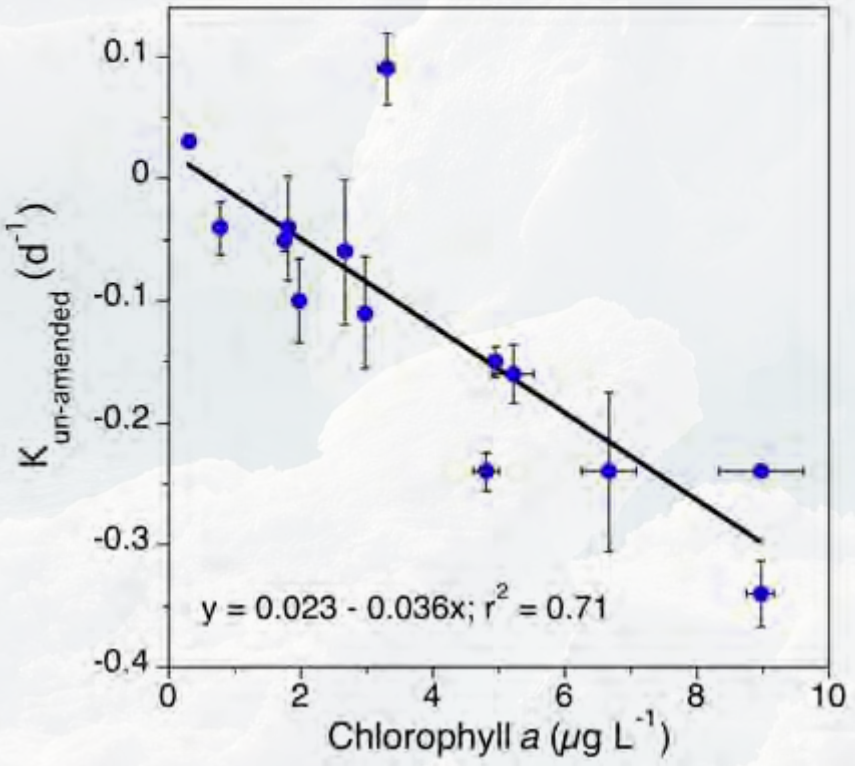




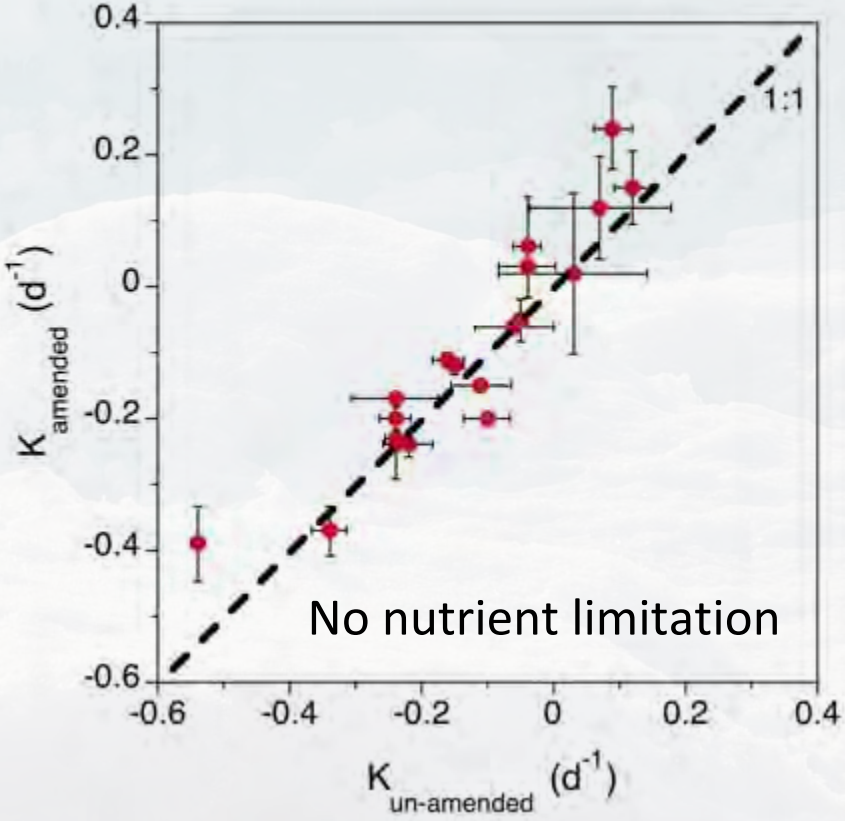


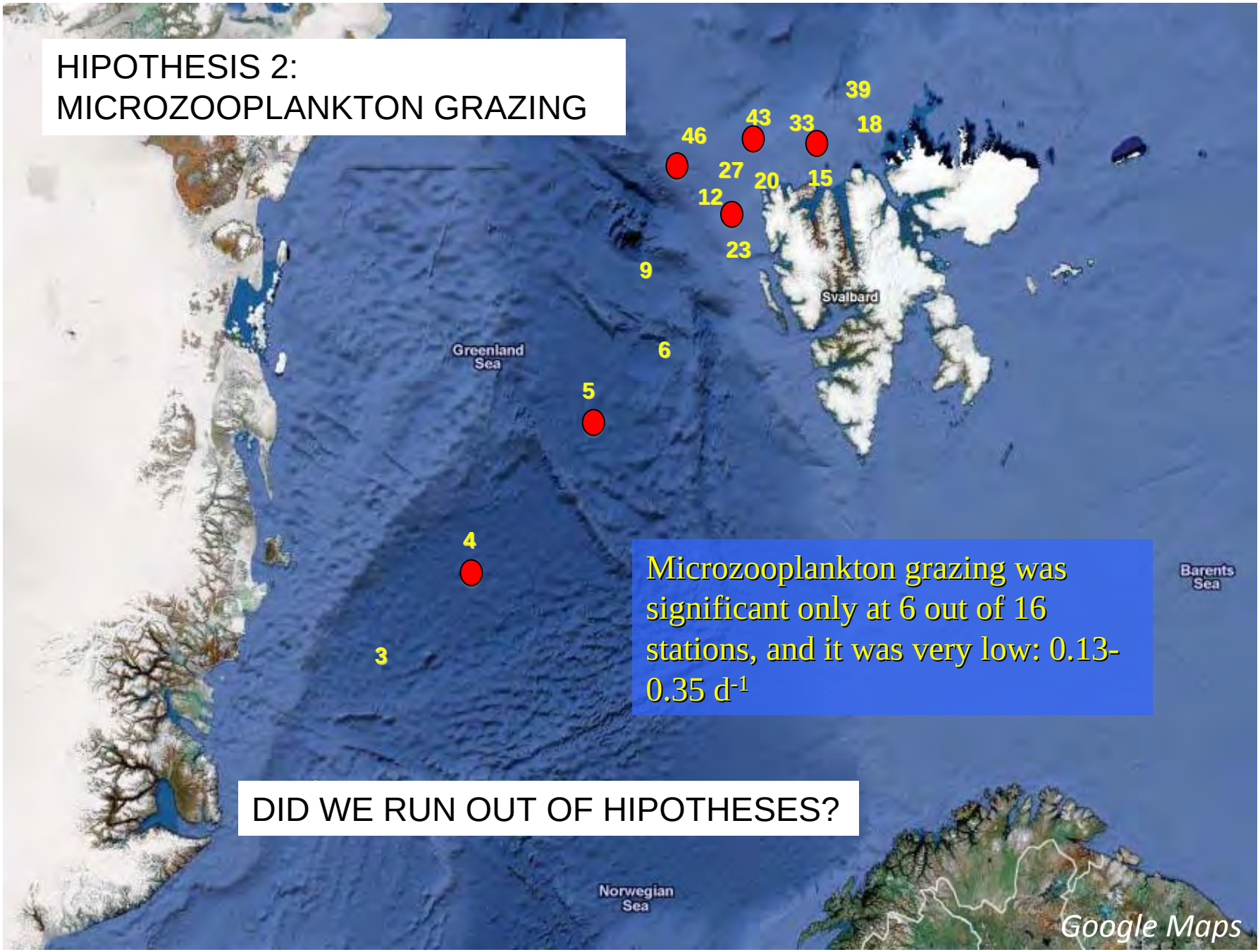
Why phytoplankton is vanishing from the water?

Biomass dependent mortality

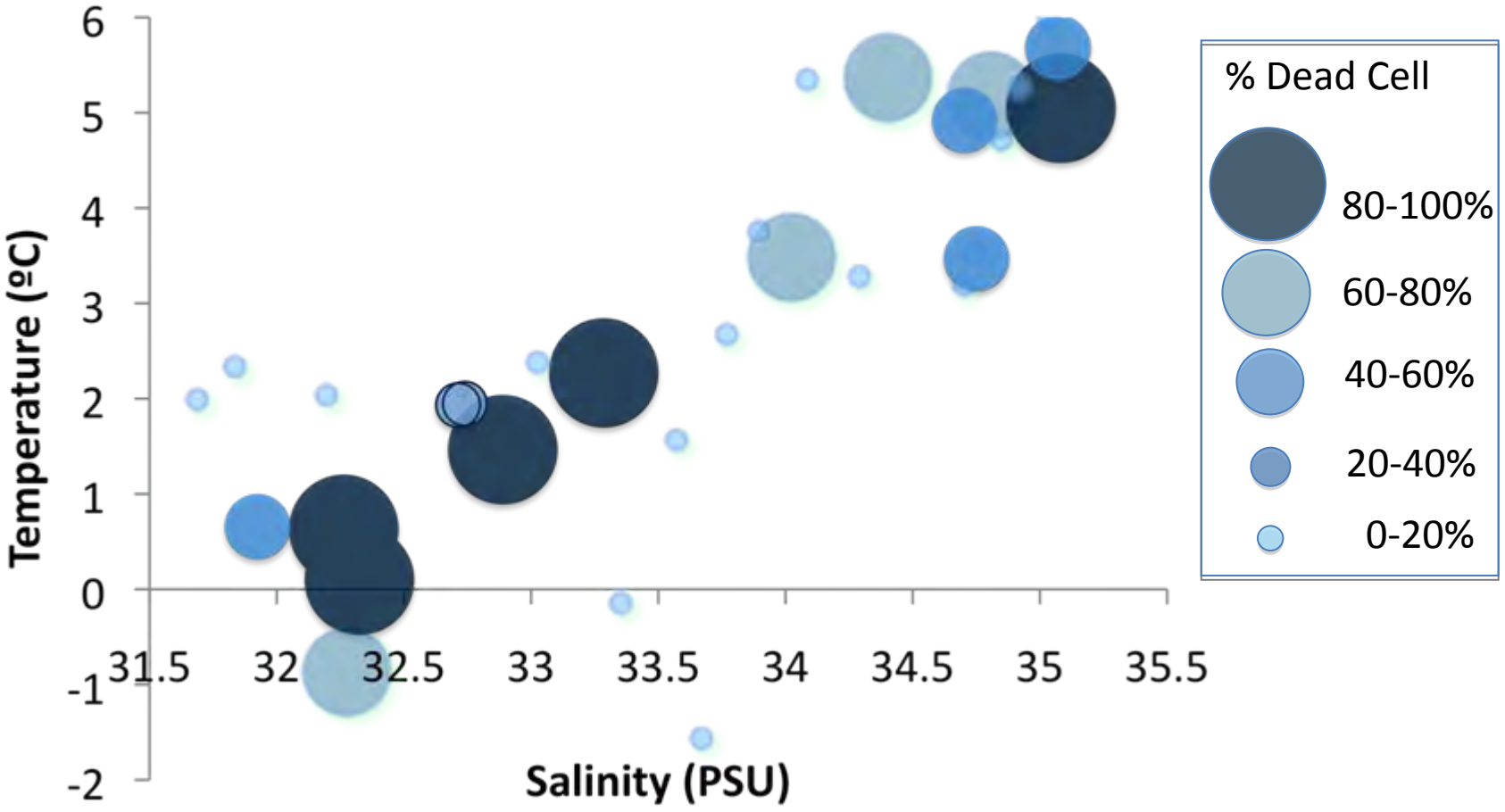


HIPOTHESIS 1:
NUTRIENT LIMITATION



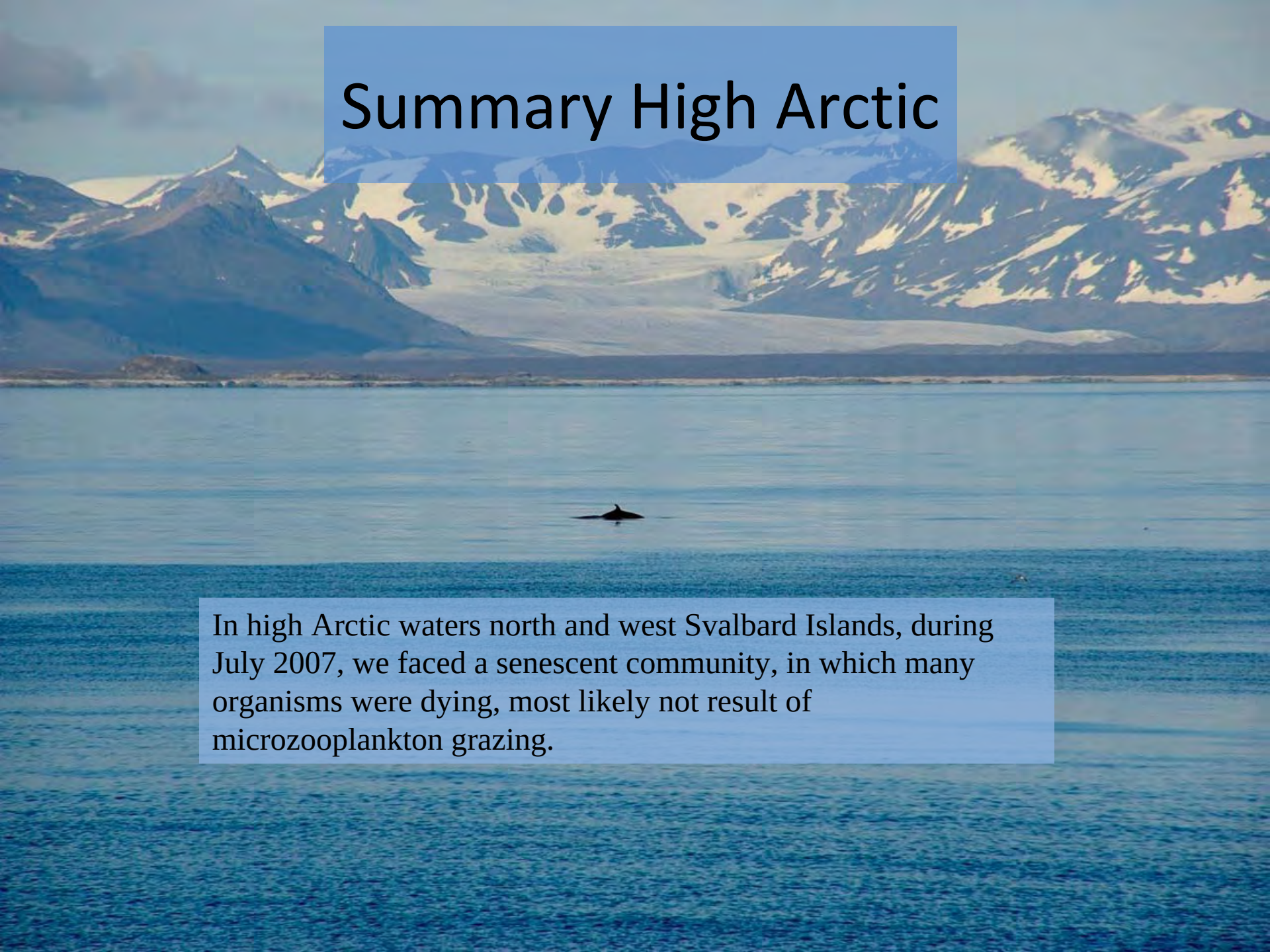

HIPOTHESIS 2:
MICROZOOPLANKTON GRAZING
39
43
33
18
46
27
20
15
12
23
9
Svalbard
Greenland Sea
6
5
4
3
Barents Sea
Norwegian Sea
Microzooplankton grazing was significant only at 6 out of 16 stations, and it was very low: 0.13-0.35 d-1
DID WE RUN OUT OF HIPOTHESES?
Google Maps

Natural *P. pouchetii* mortality (cell digestion assay which tests cell membrane permeability)



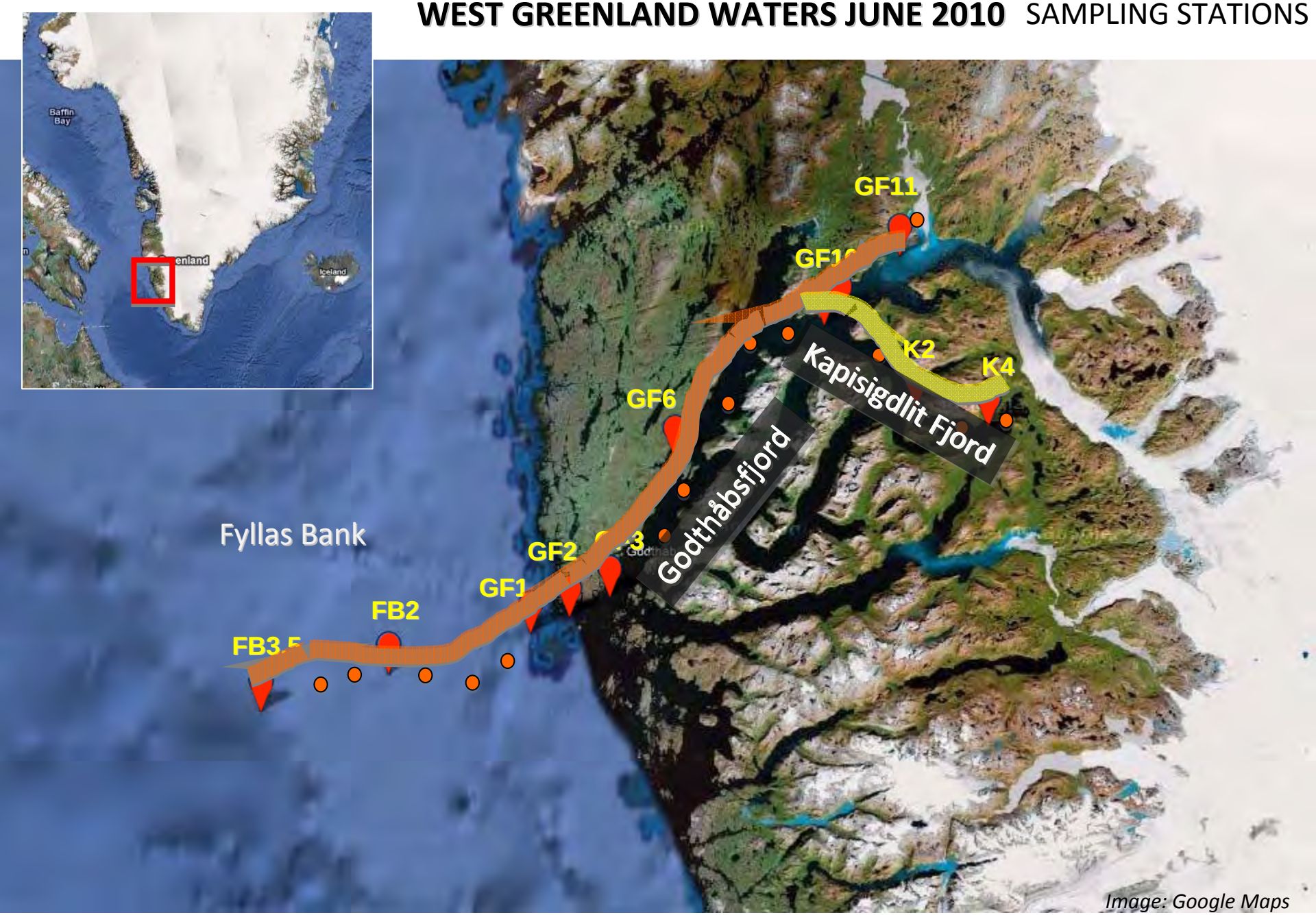
After Lasternas and Agustí 2011

Summary High Arctic

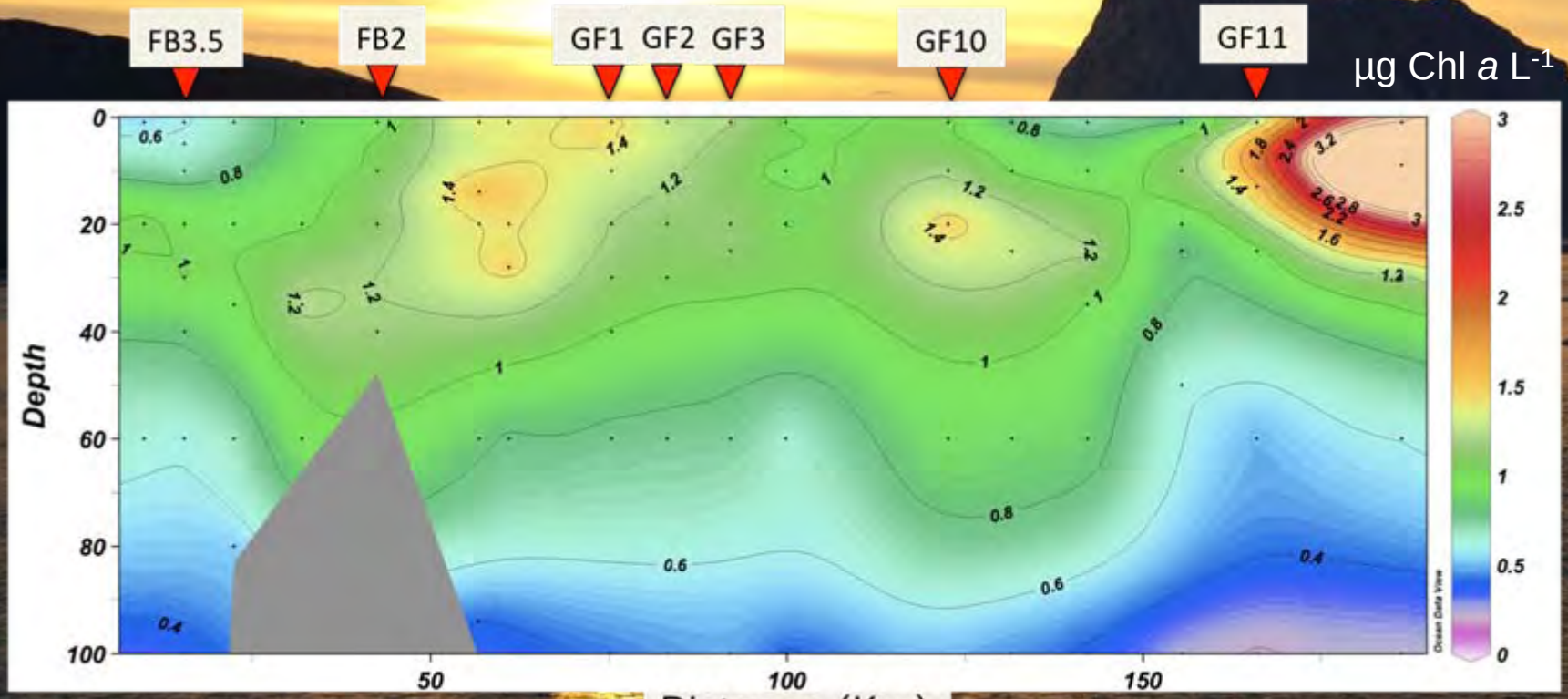


In high Arctic waters north and west Svalbard Islands, during July 2007, we faced a senescent community, in which many organisms were dying, most likely not result of microzooplankton grazing.

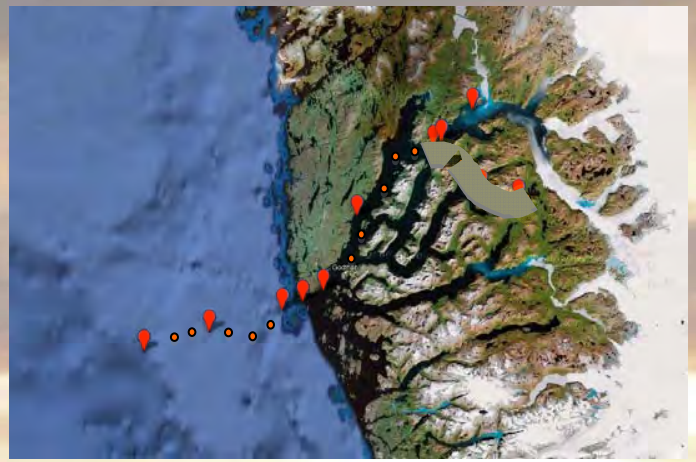
WEST GREENLAND WATERS JUNE 2010 SAMPLING STATIONS

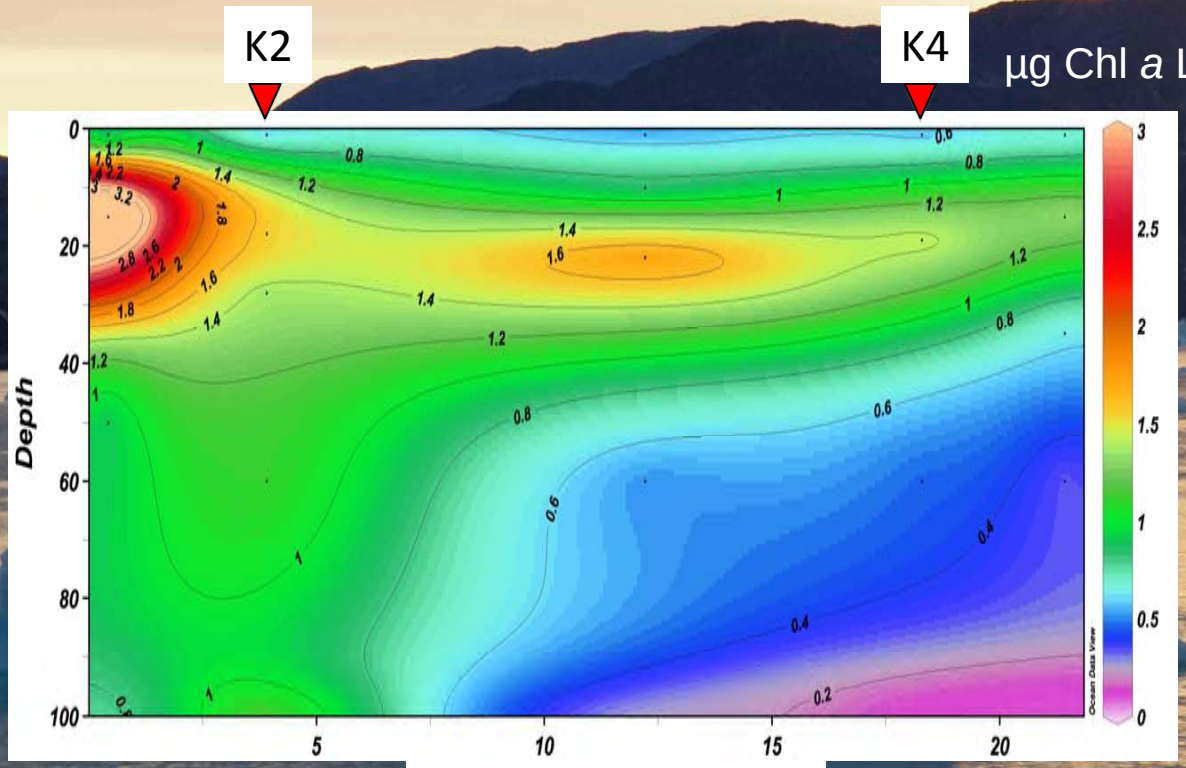


Chlorophyll *a* in the Godthåbsfjord



Chlorophyll *a in* the Kapisigdlit Fjord





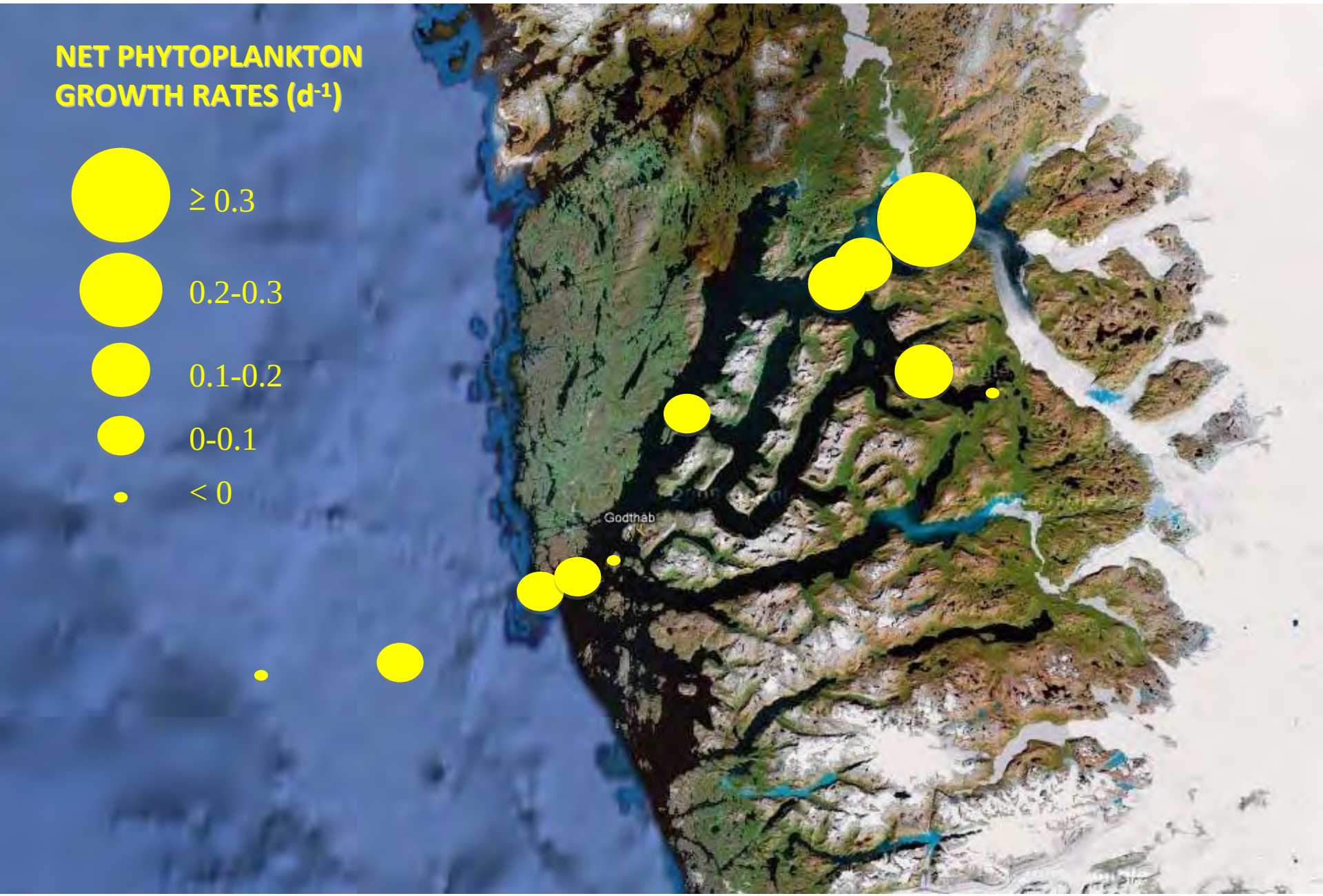
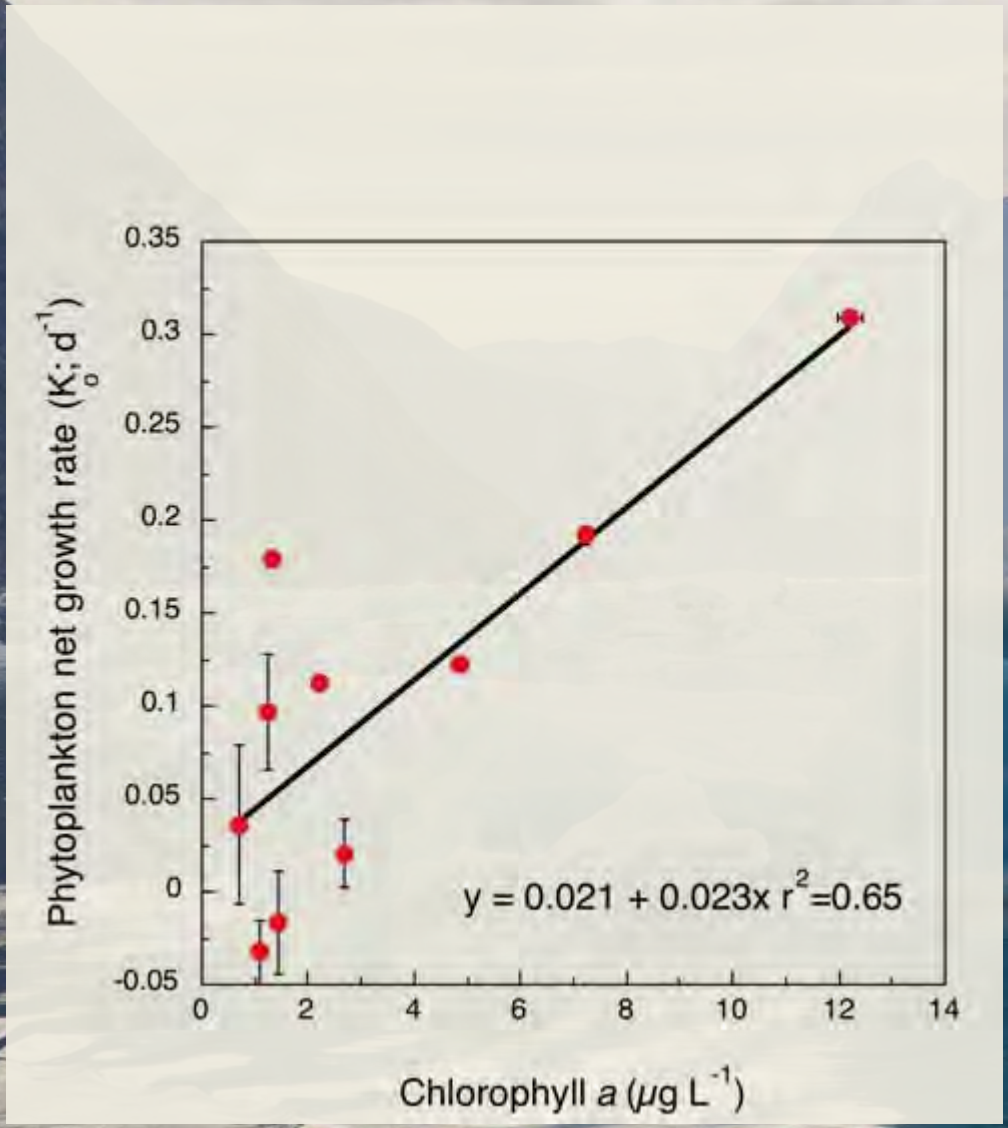


Image: Google Maps

Was phytoplankton growth dependent on biomass?



Phytoplankton growth rates were biomass-dependent.
This seems to indicate the bloom was still developing.

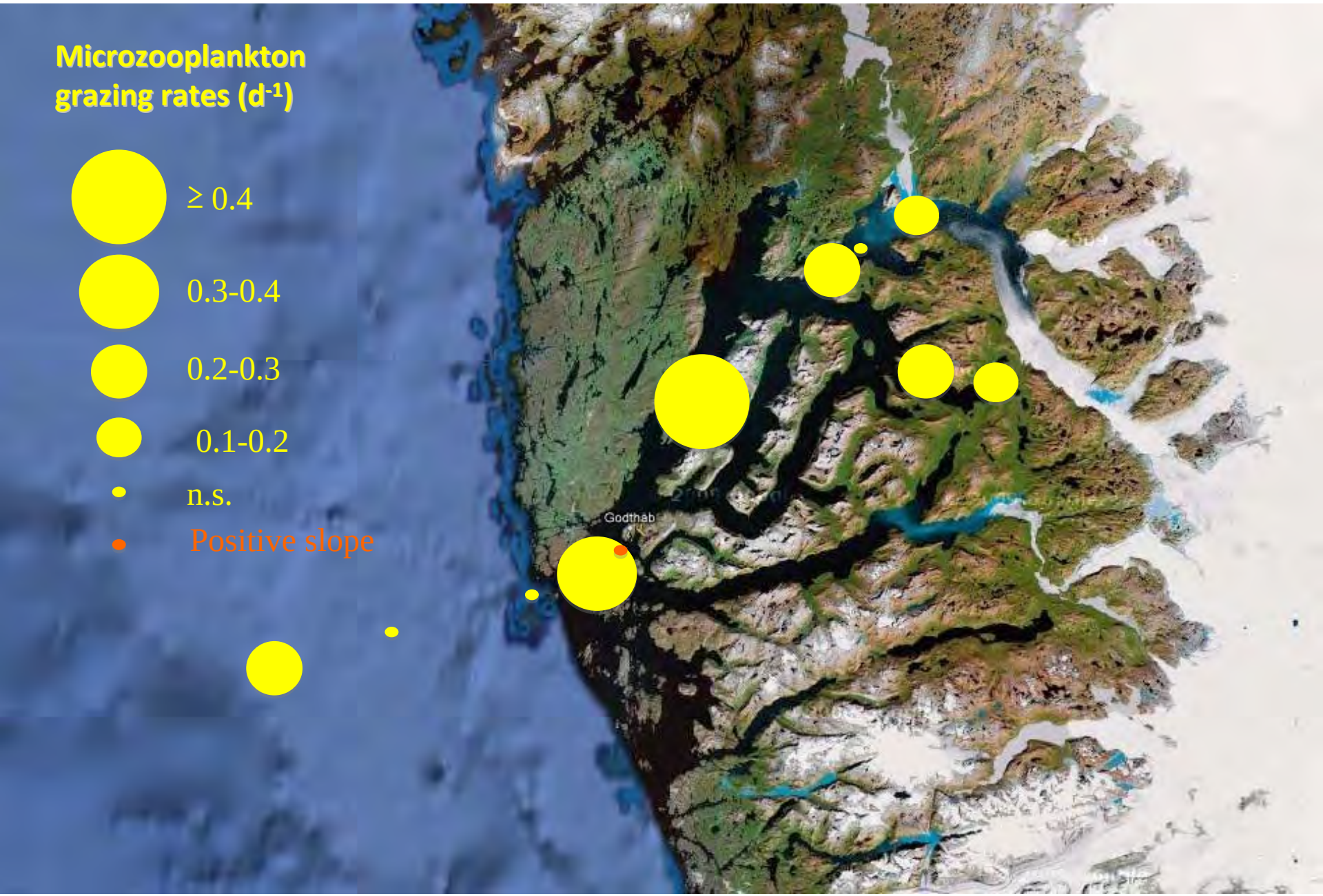


Image: Google Maps

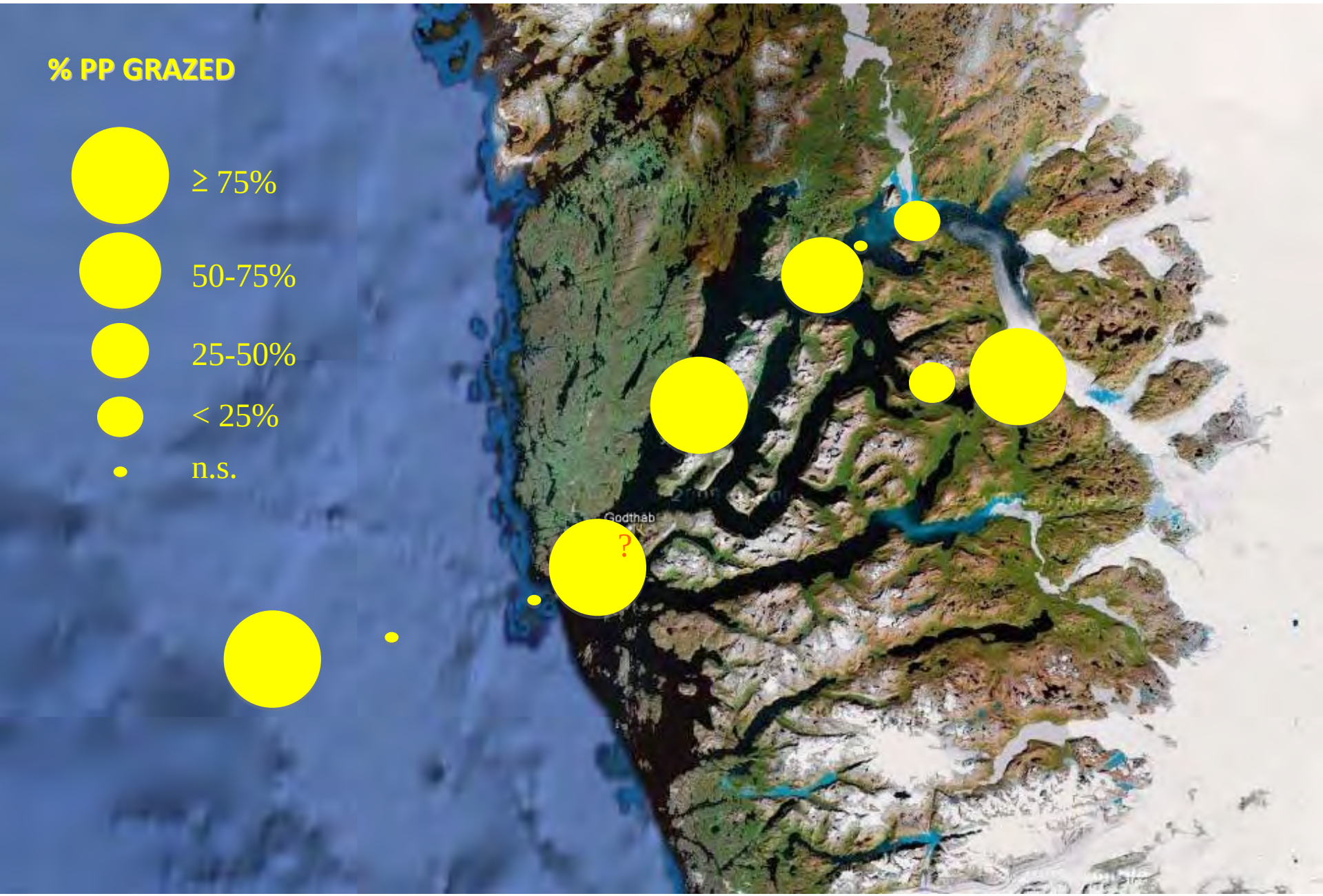
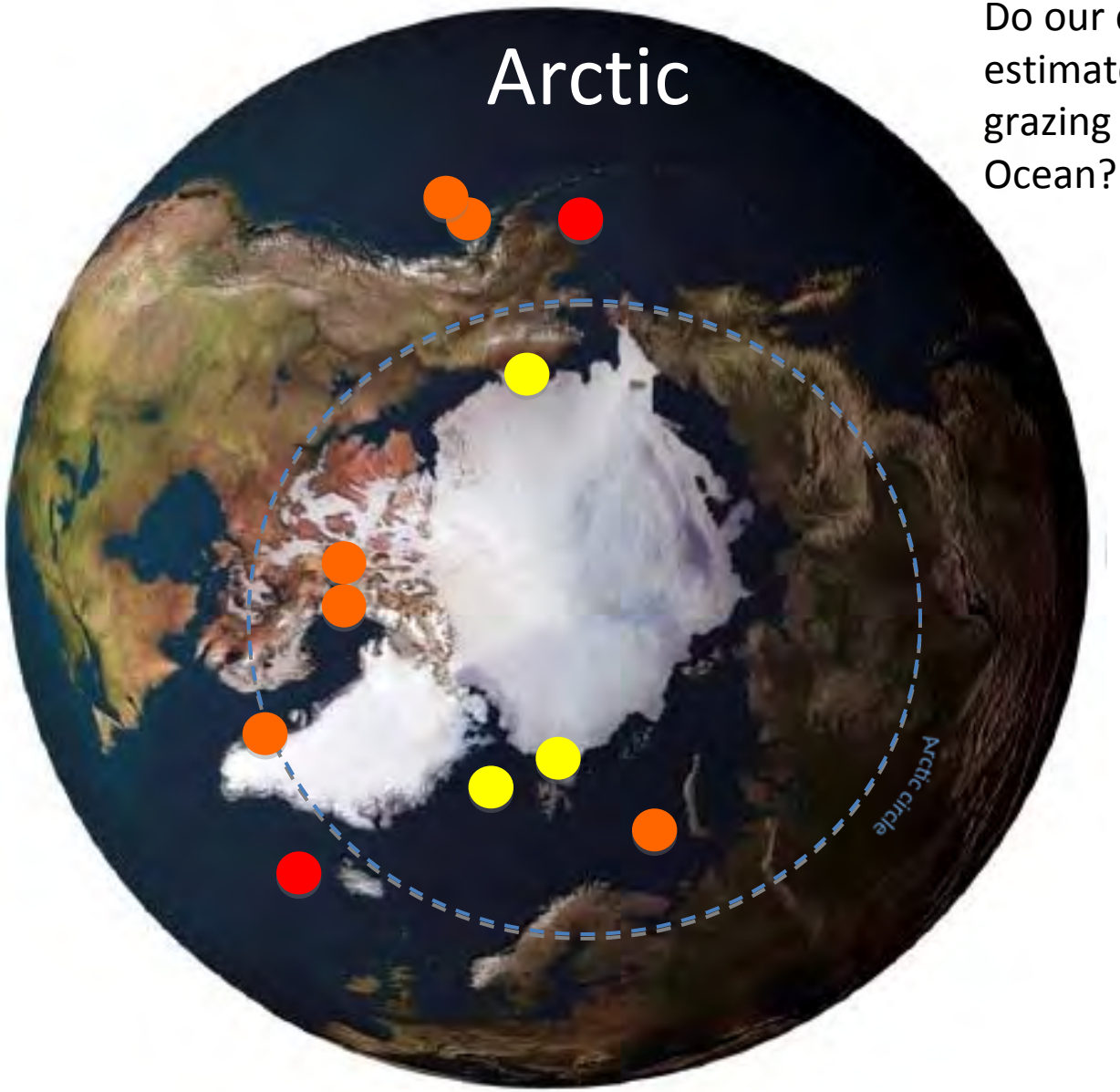


Image: Google Maps

Summary SW Greenland fjord

In the Godthåbsfjord system and adjacent waters we found a phytoplankton community expanding from the glacier out, heavily grazed in the middle part, but uncoupled from microzooplankton grazing in the inner and outer part of the fjord.

No much PP seems to be exported out of the fjord.



Do our data compare with previous estimates of microzooplankton grazing in the Arctic and Sub-Arctic Ocean?

% PP grazed daily

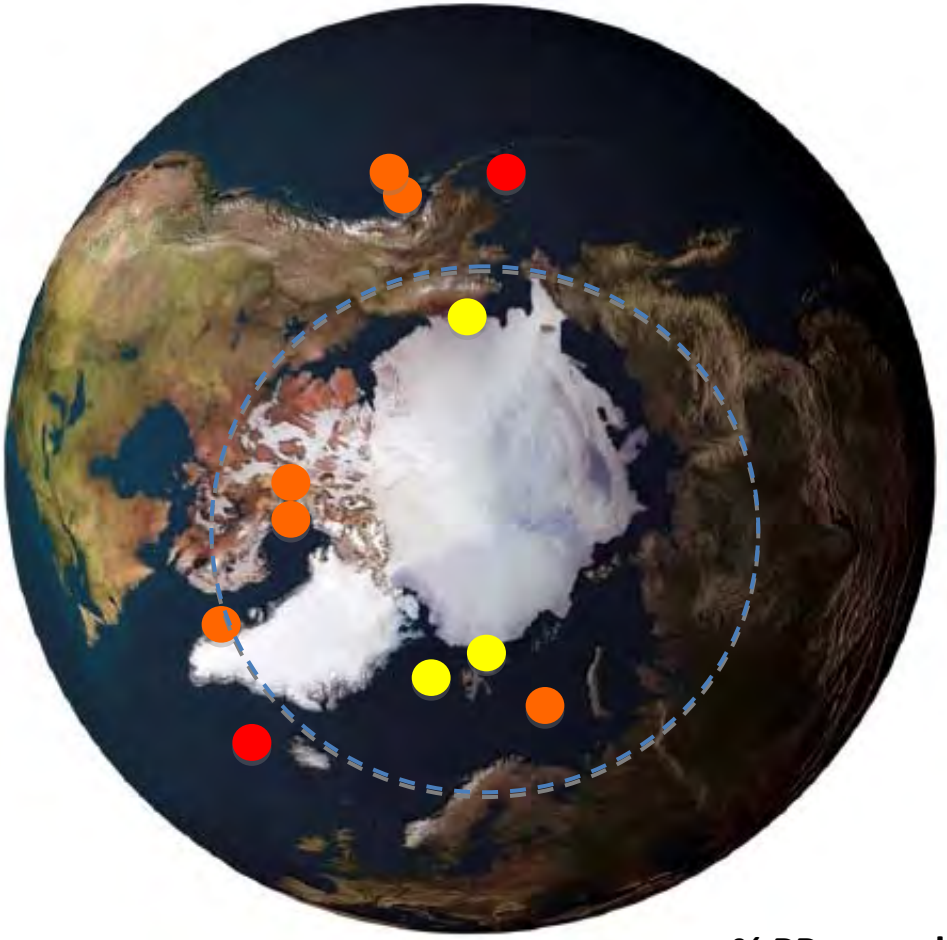
- 0 – 30%
- 30 – 80%
- > 80 %

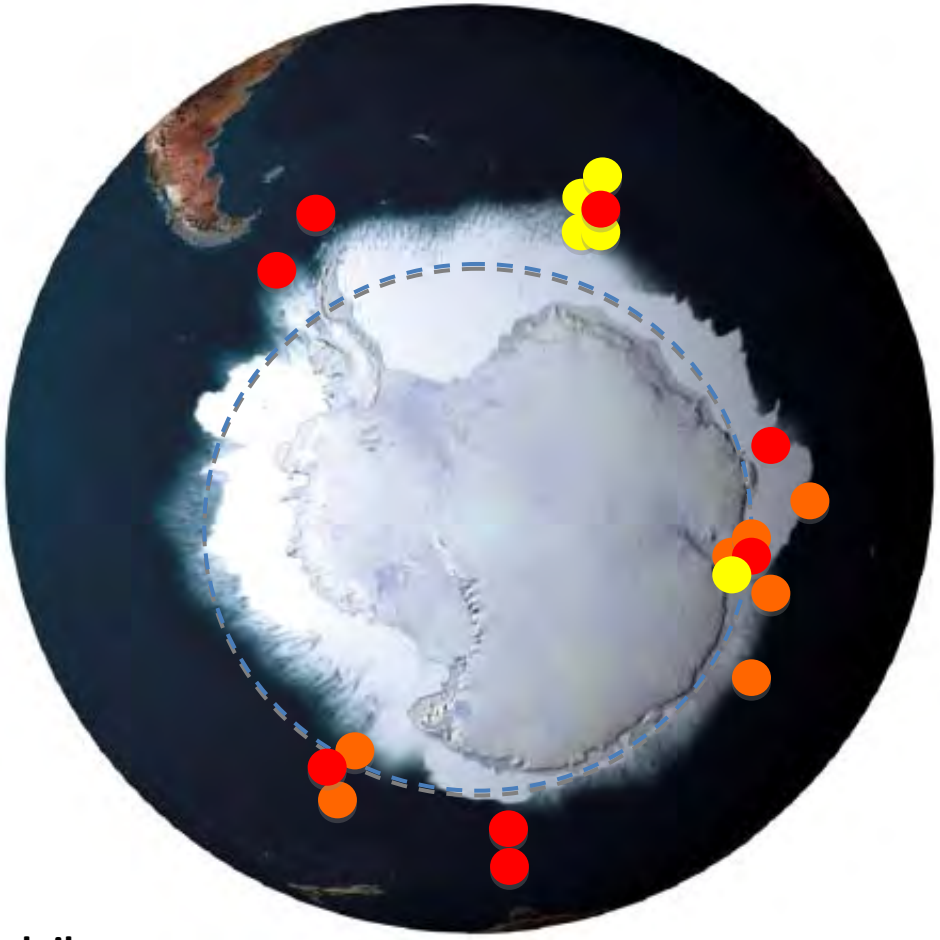
Gifford et al. 1995
Olson et al. 2002
Paranjape 1987
Sherr et al. 2009
Strom and Welschmeyer 1991
Strom et al. 2007
Verity et al. 2002

Image: www.cnes.fr

Arctic

Antarctic





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Burkill et al. 1995
Froneman et al. 1996
Froneman et al. 1997a
Froneman et al. 1997b
Froneman et al. 2004
Froneman & Perissinotto 1996
Landry et al. 2002
Landry et al. 2001
Li et al. 2001
Pearce et al. 2010 Safi et al. 2007
Selph et al. 2001
Tsuda & Kawaguchi 1997

Image: www.cnes.fr

Thanks!